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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/747,164	12/22/2000	Michael J. Lane	00451-0065	3640

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EXAMINER	
CHAKRABARTI, ARUN K	

ART UNIT	PAPER NUMBER
1634	

DATE MAILED: 01/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/747,164	Lane
Examiner	**Art Unit**
Arun Chakrabarti	1634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Dec 17, 2003* .

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-12, 14-17, 19, 21-24, 30, 32, 33, and 40-43* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-12, 14-17, 19, 21-24, 30, 32, 33, and 40-43* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *Detailed Action*

DETAILED ACTION

Election/Restriction

1. Applicant's election of Group I, corresponding to claims 1-12, 14-17, 19, 21-24, 30, 32, 33, and 40-43, submitted on December 17, 2003 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 30 and 43 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 30 is dependent on canceled and therefore non-existent claim 18. In absence of claim 18, it is not clear what is claimed in claim 30. The metes and bounds of claim 30 is therefore vague and indefinite.

Claim 43 is dependent on non-existent claim 47 (total 46 claims were originally presented). In absence of claim 47, it is not clear what is claimed in claim 43. The metes and bounds of claim 43 is therefore vague and indefinite.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-12, 14-17, 33, and 40-42 are rejected under 35 U.S.C. 103(a) as being obvious over Rebar et al. (U.S. Patent 5,789,538) (August 4, 1998) in view of Lane et al. (U.S. Patent 6,221,589 B1) (April 24, 2001).

Rebar et al teach a method of identifying a nucleic acid molecule suitable for use in a probe for detecting the presence of one or more of a family of nucleic acid molecules, comprising the steps of:

a) providing the family of first nucleic acid molecules wherein each member of the family is related to all other members of the family by consensus sequence (Figure 3, Column 2, lines 12-22);

b) providing a second nucleic acid molecule having a sequence complementary to the consensus sequences (Figure 3, Column 2, lines 12-22).

Rebar et al teach a method, wherein the target nucleic acid sequence and all its family members to be detected is a region of an oncogene or viral nucleic acid (Column 1, lines 35-64).

Rebar et al do not teach a method, wherein steps of c) determining the ability of nucleic acid molecule to form a duplex with each member of the family in the presence of a first ligand known to affect duplex formation of nucleic acid molecules, and

d) repeating step c) for a plurality of concentrations of the ligand, wherein the nucleic acid molecule suitable for use in a probe is identified in step c) at a ligand concentration at which the ability of the second nucleic acid molecule to form a duplex with each member of the family is substantially the same as its ability to form a duplex with each other member of the family.

Lane et al. teach a method, wherein steps of c) determining the ability of nucleic acid molecule to form a duplex with each member of the family in the presence of a first ligand known to affect duplex formation of nucleic acid molecules, and

d) repeating step c) for a plurality of concentrations of the ligand, wherein the nucleic acid molecule suitable for use in a probe is identified in step c) at a ligand concentration at which the ability of the second nucleic acid molecule to form a duplex with each member of the family is

substantially the same as its ability to form a duplex with each other member of the family (Figures 6-7 and Column 3, lines 42-63 and Claims 32-42).

Rebar et al do not teach a method, wherein steps c) and d) are repeated two-three times.

Lane et al. teach a method, wherein steps c) and d) are repeated two-three times (Figures 6-7 and Column 3, lines 42-63).

Rebar et al do not teach a method, further comprising the steps of g) determining the percent homology of the second nucleic acid sequence against a plurality of nucleic acid sequences in a database prior to step c) , wherein the second nucleic acid sequence is less than a predetermined homology to other non-target partially complementary nucleic acid sequences.

Lane et al. teach a method, further comprising the steps of g) determining the percent homology of the second nucleic acid sequence against a plurality of nucleic acid sequences in a database prior to step c) , wherein the second nucleic acid sequence is less than a predetermined homology to other non-target partially complementary nucleic acid sequences (Figures 6-7 and Column 3, lines 42-63).

Rebar et al do not teach a method, wherein the first and second ligands are selected from the group consisting of actinomycin D, distamycin A, diminazane aceturate, bis benzimide, and ethidium bromide.

Lane et al. teach a method, wherein the first and second ligands are selected from the group consisting of actinomycin D, distamycin A, diminazane aceturate, bis benzimide, and ethidium bromide (Claims 40-42).

Rebar et al. teach a nucleic acid capture moiety comprising a labeled probe nucleic acid sequence substantially complementary to the target duplex nucleic acid sequence and all its family members suspected of being present in a sample (as described above).

Rebar et al do not teach a kit for detecting the presence of a target nucleic acid sequence and all its family members suspected of being present in a sample, the kit comprising:

a) a nucleic acid capture moiety comprising a labeled probe nucleic acid sequence substantially complementary to the target duplex nucleic acid sequence and all its family members suspected of being present in a sample; and

b) at least one nucleic acid sequence binding ligand, wherein the ligand can promote hybridization of the target single-stranded nucleic acid sequence and all its family members to the nucleic acid capture moiety and not to other non-target partially complementary nucleic acid sequences.

Lane et al. teach a kit comprising at least one nucleic acid sequence binding ligand, wherein the ligand can promote hybridization of the target single-stranded nucleic acid sequence and all its family members to the nucleic acid capture moiety and not to other non-target partially complementary nucleic acid sequences (Column 7, line 66 to Column 8, line 9).

It would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to combine and substitute the method and kit at least one nucleic acid sequence binding ligand, wherein the ligand can promote hybridization of the target single-stranded nucleic acid sequence and all its family members to the nucleic acid capture moiety and

not to other non-target partially complementary nucleic acid sequences of Lane et al. into the method of a nucleic acid capture moiety comprising a labeled probe nucleic acid sequence substantially complementary to the target duplex nucleic acid sequence and all its family members suspected of being present in a sample of Rebar et al., since Lane et al. states, "The methods and compositions of the invention allow the melting temperatures of a plurality of nucleic acid duplexes to be normalized. By normalizing the melting temperatures of duplexes, the sequence-dependent differences in binding to a probe are eliminated. Thus, the invention provides methods and compositions suitable for improved SBH experiments (Column 2, lines 61-67)." An ordinary practitioner would have been motivated to combine and substitute the method and kit at least one nucleic acid sequence binding ligand, wherein the ligand can promote hybridization of the target single-stranded nucleic acid sequence and all its family members to the nucleic acid capture moiety and not to other non-target partially complementary nucleic acid sequences of Lane et al. into the method of a nucleic acid capture moiety comprising a labeled probe nucleic acid sequence substantially complementary to the target duplex nucleic acid sequence and all its family members suspected of being present in a sample of Rebar et al. in order to achieve the express advantages noted by Lane et al., of an invention which provides methods and compositions suitable for improved SBH experiments.

Rebar et al. in view of Lane et al do not teach the method, wherein the first nucleic acid molecules of the family are at least a% homologous with each other, a being a number greater than 0 and less than 100, comprising the further steps of:

I) providing a third nucleic acid molecule which is no more than b% homologous with each other of the first nucleic acid molecules of the family, where b is a number greater than 0 and less than a.

However, it is *prima facie* obvious from the teaching and suggestion of Rebar et al. in view of Lane et al that designing any novel nucleic acid sequences for hybridization represents routine optimization with regard to the preselected target site, which routine optimization parameters are explicitly recognized to an ordinary practitioner in the relevant art. As noted *In re Aller*, 105 USPQ 233 at 235,

> More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.

Routine optimization is not considered inventive and no evidence has been presented that the specific combinations and homology of nucleotide sequences was other than routine, that the products resulting from the optimization have any unexpected properties, or that the results should be considered unexpected in any way as compared to the closest prior art.

6. Claims 19, 21-24, and 32 are rejected under 35 U.S.C. 103(a) as being obvious over Rebar et al. (U.S. Patent 5,789,538) (August 4, 1998) in view of Lane et al. (U.S. Patent 6,221,589 B1) (April 24, 2001) further in view of Lane et al. (U.S. Patent 6,027,884) (February 22, 2000).

Rebar et al. (U.S. Patent 5,789,538) (August 4, 1998) in view of Lane et al. (U.S. Patent 6,221,589 B1) (April 24, 2001) teach the method and kit of claims 1-12, 14-17, 33, and 40-42 as described above.

Rebar et al. (U.S. Patent 5,789,538) (August 4, 1998) in view of Lane et al. (U.S. Patent 6,221,589 B1) (April 24, 2001) do not teach the method, wherein a first and second single stranded nucleic acid molecule hybridization increases the free energy of duplex formation at least n-fold, wherein n is 2, 5, 10, 50, 100, 500, 103, 104, 105, and 106, a compound which, when contacted with a reaction mixture will decrease the free energy of duplex formation by at least n-fold, wherein n is 2, 5, 10, 50, 100, 500, 103, 104, 105, and 106.

Lane et al. (U.S. Patent 6,027,884) (February 22, 2000) teach the method, wherein a first and second single stranded nucleic acid molecule hybridization increases the free energy of duplex formation at least n-fold, wherein n is 2, 5, 10, 50, 100, 500, 103, 104, 105, and 106, a compound which, when contacted with a reaction mixture will decrease the free energy of duplex formation by at least n-fold, wherein n is 2, 5, 10, 50, 100, 500, 103, 104, 105, and 106 (Tables 1-3, and 5, and Figure 7, and Column 44, line 50 to Column 57, line 2).

It would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to combine and substitute the method, wherein a first and second single stranded nucleic acid molecule hybridization increases the free energy of duplex formation at least n-fold, wherein n is 2, 5, 10, 50, 100, 500, 103, 104, 105, and 106, a compound which, when contacted with a reaction mixture will decrease the free energy of duplex formation by at least n-

fold, wherein n is 2, 5, 10, 50, 100, 500, 103, 104, 105, and 106 of Lane et al. (U.S. Patent 6,027,884) (February 22, 2000) into the method of a nucleic acid capture moiety comprising a labeled probe nucleic acid sequence substantially complementary to the target duplex nucleic acid sequence and all its family members suspected of being present in a sample of Rebar et al.. in view of Lane et al. (U.S. Patent 6,221,589 B1) (April 24, 2001), since Lane et al. (U.S. Patent 6,027,884) (February 22, 2000) states, "This invention relates to the formation and dissolution of double stranded nucleic acid molecules and to the interactions between double stranded and single stranded nucleic acid molecules and nucleic-acid binding ligands. For example, it relates to: DNA sequence design and construction including, e,g., methods of determining and preparing DNA sequences with selected reaction attributes, such as binding affinities for their respective ligands; and the use of such sequences in diagnostic or analytical procedures to detect target DNA, e.g., viral DNA (Column 1, lines 20-30)." An ordinary practitioner would have been motivated to combine and substitute the method, wherein a first and second single stranded nucleic acid molecule hybridization increases the free energy of duplex formation at least n-fold, wherein n is 2, 5, 10, 50, 100, 500, 103, 104, 105, and 106, a compound which, when contacted with a reaction mixture will decrease the free energy of duplex formation by at least n-fold, wherein n is 2, 5, 10, 50, 100, 500, 103, 104, 105, and 106 of Lane et al. (U.S. Patent 6,027,884) (February 22, 2000) into the method of a nucleic acid capture moiety comprising a labeled probe nucleic acid sequence substantially complementary to the target duplex nucleic acid sequence and all its family members suspected of being present in a sample of Rebar et al. .in view of Lane et al.

(U.S. Patent 6,221,589 B1) (April 24, 2001) in order to achieve the express advantages noted by Lane et al. (U.S. Patent 6,027,884), of an invention which relates to: DNA sequence design and construction including, e,g., methods of determining and preparing DNA sequences with selected reaction attributes, such as binding affinities for their respective ligands; and the use of such sequences in diagnostic or analytical procedures to detect target DNA, e.g., viral DNA.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arun Chakrabarti, Ph.D., whose telephone number is (571) 272-0740. The examiner can normally be reached on 7:00 AM-4:30 PM from Monday to Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion, can be reached on (571) 272-0782. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group analyst Chantae Dessau whose telephone number is (571) 272-0518.

Arun Kr. Chakrabarti

ARUN K. CHAKRABARTI
PATENT EXAMINER

Arun Chakrabarti

Patent Examiner,

January 14, 2004

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